

# PATENT ABSTRACTS OF JAPAN

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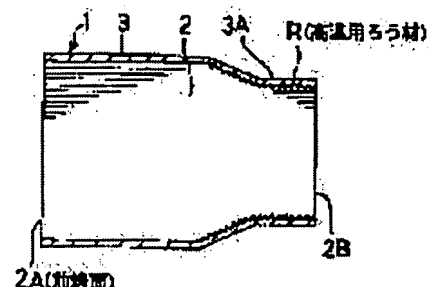
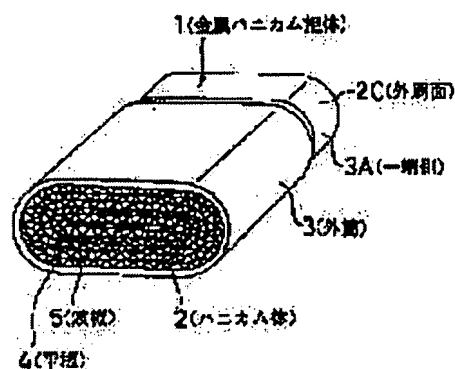
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 (22)Date of filing : 12.07.1993 (72)Inventor : TANABE HIROSHI  
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## (54) METAL HONEYCOMB CARRIER AND PRODUCTION THEREOF

### (57)Abstract:

PURPOSE: To prevent the occurrence of buckling in the flat plates and corrugated plates forming a honeycomb member by reducing the compression force in a diameter direction at the time of squeezing by squeezing one end part of an outer cylinder and closely bonding the outer peripheral surface of the honeycomb member and one end part of the outer cylinder to solder both of them.

CONSTITUTION: A catalyst converter for purifying exhaust gas is arranged to the exhaust system of a car. The metal honeycomb carrier 1 of the catalyst converter is formed by inserting a honeycomb member 2 wherein metal flat plates 4 and metal corrugated plates 5 are alternately wound in an outer cylinder 3 and bonding the outer peripheral surface 2C of the honeycomb member 2 and the outer cylinder 3. In this case, the flat plates 4 and corrugated plates 5 at least at one end surface 2A of the honeycomb member 2 are integrated by laser welding. One end part 3A of the outer cylinder 3 having the honeycomb member 2 provided thereto is squeezed and the



outer peripheral surface 2C of the honeycomb member 2 and one end part 3A of the outer cylinder 3 are soldered by a high temp. solder material R. By this constitution, when one end part 3A of the outer cylinder 3 is squeezed, the compression force in the diameter direction of the outer cylinder is reduced.

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## LEGAL STATUS

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CLAIMS

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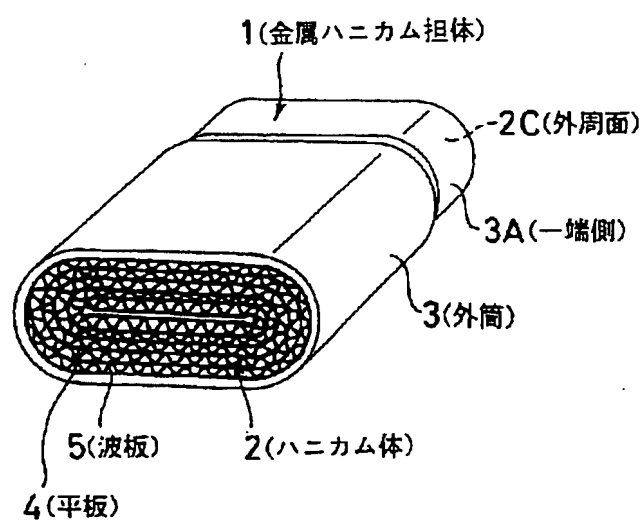

[Claim(s)]

[Claim 1] In the metal honeycomb support which inserts the honeycomb object (2) rolls a metal plate (4) and a metal corrugated plate (5) by turns, and they come to carry out a time into an outer case (3), and comes to join the peripheral face (2C) and outer case (3) of a honeycomb object (2) While unifying the plate (4) in one [ at least ] end face (2A) of a honeycomb object (2), and a corrugated plate (5) by laser welding Metal honeycomb support characterized by extracting the end side (3A) of the outer case (3) put on the honeycomb object (2), and coming to carry out soldering junction of the peripheral face (2C) side of a honeycomb object (2), and the end side (3A) of an outer case (3) by high-temperature-service wax material (R).

[Claim 2] Ring arrival of the high-temperature-service wax material (R) is carried out to the end side (3A) of the honeycomb object (2) which rolls a metal plate (4) and a metal corrugated plate (5) by turns, and comes to carry out a time. After inserting into an outer case (3) and extracting and reducing the diameter of the end side (3A) of an outer case (3), Soldering junction of the peripheral face (2C) of a honeycomb object (2) is carried out the end side (3A) of an outer case (3). At the last process of said soldering process or back process of a honeycomb object (2) and an outer case (3) The manufacture method of construction of the metal honeycomb support characterized by unifying the plate (4) in one [ at least ] end face (2A) of a honeycomb object (2), and a corrugated plate (5) by laser welding.

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[Translation done.]

Drawing selection Representative drawing 

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the metal honeycomb support used in order to purify the exhaust gas of an automobile etc., and its manufacture method of construction.

[0002]

[Description of the Prior Art] Generally, in order to purify exhaust gas, for the reason, the catalytic converter is arranged at the exhaust air system of an automobile.

[0003] It is known as what is shown in JP,2-14747,B as metal honeycomb support of a catalytic converter shows drawing 4. In drawing, a sign 101 is metal honeycomb support and this metal honeycomb support 101 consists of a honeycomb object 102 and an outer case 103 into which this honeycomb object 102 is put.

[0004] Roll metal plate 102A and corrugated plate 102B by turns, and the honeycomb object 102 comes to carry out a time, and is constituted in the shape of a cylinder. And in manufacturing the above-mentioned metal honeycomb support 101, first, the honeycomb object 102 is inserted into an outer case 103, and the periphery of an outer case 103 is extracted with a dice etc. after that, it heats to an elevated temperature after an appropriate time, and the peripheral face and outer case 103 of the honeycomb object 102 are unified by diffused junction, and the interior of the honeycomb object 102 is unified.

[0005]

[Problem(s) to be Solved by the Invention] However, if it is in the conventional metal honeycomb support 101, in order to carry out diffused junction of plate 102A which narrows down an outer case 103 and constitutes the honeycomb object 102, and the corrugated plate 102B, it is necessary to enlarge compressive force of the direction of a path. When the drawing cost of an outer case 103 is enlarged, a buckling will occur in honeycomb object 102 the very thing, the touch area of an outer case 102 and the honeycomb object 101 will decrease, and the bonding strength will fall there. Therefore, it becomes it is large and difficult [ things ] about the compressive force of the direction of a path.

[0006] Although unification of the peripheral face of a honeycomb object, the junction between outer cases and the plate inside a honeycomb object, and a corrugated plate is attained by diffused junction, since there is an above-mentioned problem, the thing using soldering junction is known for the above-mentioned conventional example as shown in JP,2-187151,A.

[0007] The metal honeycomb support shown in this official report solders the outermost periphery of a honeycomb object, and the contact section of the plate of the several layers layer of that near in all, and a corrugated plate in the contact section list of a honeycomb object and an outer case, and comes to carry out diffused junction of the contact section of the plate of the remaining layers of a honeycomb object, and a corrugated plate.

[0008] If it is in this metal honeycomb support, from the outermost layer of drum of a honeycomb object to several layers, soldering junction will be needed and the cost rise of wax material will be caused so much. Moreover, in high-temperature-service wax material, the aluminum contained in a plate and a corrugated plate will be spread, and will be diluted, and the oxidation resistance of several layers will

get worse from the outermost layer of drum of the honeycomb object under a high temperature service. [0009] It is what was made in order that this invention might solve an above-mentioned trouble. The object It can join without carrying out soldering junction of the interior of a honeycomb object, while preventing that a buckling occurs in the plate which makes compressive force of the direction of a path small, and constitutes a honeycomb object, and a corrugated plate in case the end side of an outer case is extracted. Furthermore, it is offering the metal honeycomb support which can raise the oxidation resistance of several layers from the outermost layer of drum of a honeycomb object, and its manufacture method of construction.

[0010]

[Means for Solving the Problem] In the metal honeycomb support which invention according to claim 1 inserts the honeycomb object rolls a metal plate and a metal corrugated plate by turns, and they come to carry out a time into an outer case, and comes to join the peripheral face and outer case of a honeycomb object While unifying the plate in one [ at least ] end face of a honeycomb object, and a corrugated plate by laser welding, it is characterized by extracting the end side of the outer case put on the honeycomb object, and coming to carry out soldering junction of the peripheral face side of a honeycomb object, and the end side of an outer case by high-temperature-service wax material.

[0011] Invention according to claim 2 carries out ring arrival of the high-temperature-service wax material to the end side of the honeycomb object which rolls a metal plate and a metal corrugated plate by turns, and comes to carry out a time. It inserts into an outer case, and after extracting and reducing the diameter of the end side of an outer case, soldering junction of the peripheral face of a honeycomb object is carried out the end side of an outer case. At the process before said soldering process of a honeycomb object and an outer case, or an after process It is characterized by unifying the plate in one [ at least ] end face of a honeycomb object, and a corrugated plate by laser welding.

[0012]

[Function] Since soldering junction is made according to this invention where the peripheral face [ of a honeycomb object ] and end side of an outer case is stuck by extracting the end side of the shaft orientations of an outer case as explained above Extent to which the peripheral face and outer case of a honeycomb object are stuck is enough as the degree of diameter reduction of the outer case by spinning, it is not necessary to narrow down an outer case and the compressive force of the direction of a path in the case of spinning becomes small, so that diffused junction of the plate and corrugated plate which constitute a honeycomb object is carried out.

[0013]

[Example] Hereafter, a drawing explains the example of this invention. Drawing 1 and drawing 2 show the metal honeycomb support concerning the example of this invention. In drawing, a sign 1 is the metal honeycomb support concerning this example, and this metal honeycomb support 1 consists of a honeycomb object 2 and an outer case 3 which inserts the honeycomb object 2. In the ends of the metal honeycomb support 1, a diffuser (not shown) is combined, respectively and the catalytic converter (not shown) is constituted.

[0014] Honeycomb object 2 Roll a metal plate 4 and a metal corrugated plate 5 by turns, they come to carry out a time, and it is constituted in the shape of an elliptic cylinder. The outermost layer of drum serves as a plate 4. The outer case 3 is made from the alloy which consists of a ferritic-stainless-steel alloy like SUS430, and the board thickness is set to about 1.5-2mm.

[0015] The plate 4 and the corrugated plate 5 are made from the ferritic-stainless-steel alloy containing Cr20% and aluminum(aluminum)5%, and the board thickness is set to about 50 micrometers.

[0016] By laser welding, the plate 4 in the front end side of the honeycomb object 2 and a corrugated plate 5 fix, and are unified. Thereby, the film out phenomenon of the honeycomb object 2 can be prevented. And where the diameter is reduced by extracting end side 3A of the outer case 3 put on the honeycomb object 2 (from back end side 2B of the honeycomb object 2 to a part for an abbreviation center section) (in the condition of having stuck end side 3A of peripheral face 2C of the honeycomb object 2, and an outer case 3) Soldering junction of the end side 3A of peripheral face 2C of the honeycomb object 2 and an outer case 3 is carried out by the high-temperature-service wax material R

which consists of nickel wax foil material.

[0017] Next, drawing 3 explains the manufacture method of construction of the metal honeycomb support 2 of a configuration like the above. First, in a step (1), the honeycomb object 2 rolls a metal plate 4 and a metal corrugated plate 5 by turns, and they come to carry out a time is prepared. At this time, by laser welding, the plate 4 in front end side 2A of the honeycomb object 2 and a corrugated plate 5 fix, and are unified.

[0018] In a step (2), the high-temperature-service wax material R which is from nickel wax foil material on the end side of the honeycomb object 2 is involved in, and the 1st intermediate field 6 are obtained. In a step (3), this 1st intermediate field 6 are inserted into an outer case 3, and if it puts into a heating furnace and elevated-temperature heat treatment is performed after extracting and reducing the diameter of end side 3A of an outer case 3 by the mechanical means of a dice etc., as shown in a step (4), soldering junction of peripheral face 2C of end side 3A of an outer case 3 and the honeycomb object 2 will be carried out.

[0019] Since according to the configuration like \*\*\*\* soldering junction is made where end side 3A of peripheral face 2C of the honeycomb object 2 and an outer case 3 is stuck by extracting end side 3A of an outer case 3 The degree of diameter reduction of end side 3A of the outer case 3 by spinning Extent to which end side 3A of peripheral face 2C of the honeycomb object 2 and an outer case 3 is stuck is enough, it is not necessary to narrow down end side 3A of an outer case 3, and compressive force of the direction of a path can be made small, so that diffused junction of the plate 4 and corrugated plate 5 which constitute the honeycomb object 2 is carried out.

[0020] Therefore, it can prevent that a buckling occurs in the plate 4 which constitutes the honeycomb object 2 like the conventional example, and a corrugated plate 5. Moreover, by carrying out soldering junction of the end side 3A of peripheral face 2C of the honeycomb object 2, and an outer case 3, since laser welding has fixed, front end side 2A of the honeycomb object 2 can make soldering junction of the part of several layers unnecessary from the outermost layer of drum of the honeycomb object 2, and the cost cut of wax material can be aimed at so much. Moreover, diffused junction can be made unnecessary in order to fix the interior of the honeycomb object 2.

[0021] Furthermore, in the high-temperature-service wax material R, the aluminum contained in the plate of a honeycomb object and a corrugated plate is spread, and is diluted with general soldering junction, and, in several layers, especially the oxidation resistance under a high temperature service gets worse from the outermost layer of drum of a honeycomb object.

[0022] In this example, since temperature is low more nearly substantially than the temperature of the honeycomb object 2 interior where soldering junction is carried out, the outer case 3 is always cooled by outer air, and only peripheral face 2C and the outer case 3 of the honeycomb object 2 went up with exhaust gas, it curses honeycomb object 2 with an outer case 3, and the oxidation resistance of the section can be prevented.

[0023] And since soldering junction of peripheral face 2C and the outer case 3 of the honeycomb object 2 is carried out, there is no room to generate a clearance between peripheral face 2C of the honeycomb object 2 and an outer case 3, and bypass prevention of exhaust gas can be aimed at.

[0024] In addition, in this example, although fixed and unified by laser welding, the plate 4 in front end side 2A of the honeycomb object 2 and a corrugated plate 5 can also be fixed and unified by laser welding, and the plate 4 in back end side 2B and a corrugated plate 5 can fix order end-face 2A, the plate 4 in 2B, and a corrugated plate 5 by laser welding, respectively, and can also unify them.

[0025] Moreover, in this example, although it is a process before said soldering process of the honeycomb object 2 and an outer case 3 and laser welding of the interior of the honeycomb object 2 is carried out, laser welding can also be carried out at an after [ a soldering process ] process.

[0026] Furthermore, in this example, although the outermost layer of drum of the honeycomb object 2 serves as a plate 4, it can also make the short pitch corrugated sheet 5 with small irregularity the outermost layer of drum of the honeycomb object 2. And although the plate 4 and the corrugated plate 5 are made from the ferritic-stainless-steel alloy containing Cr20% and aluminum(aluminum)5% in this example and the board thickness is set to about 50 micrometers Without being limited to this numeric

value, Cr18% and aluminum(aluminum)3% are contained and a plate 4 and a corrugated plate 5 can be used as aluminum content ferritic-stainless-steel alloys, such as a ferritic-stainless-steel alloy of about 30 micrometers of board thickness, for example.

[0027] And although what kind of its thing is also usable in this example again if an outer case 3 is a ferritic-stainless-steel alloy, the alloy which does not contain the metal which is easy to diffuse with heating like SUS430 mentioned above is desirable. Since aluminum (aluminum) diffuses with heating the stainless alloy which contains aluminum (aluminum) even if thermal resistance is good in wax material, I will shine and reinforcement may be reduced, caution is needed at the time of an activity.

[0028]

[Effect of the Invention] Since soldering junction is made according to this invention where the peripheral face [ of a honeycomb object ] and end side of an outer case is stuck by extracting the end side of an outer case as explained above Extent to which the peripheral face [ of a honeycomb object ] and end side of an outer case is stuck is enough as the degree of diameter reduction by the side of the end of the outer case by spinning, and it does not need to narrow down the end side of an outer case and can make compressive force of the direction of a path small, so that diffused junction of the plate and corrugated plate which constitute a honeycomb object is carried out.

[0029] Therefore, it can prevent that a buckling occurs in the plate which constitutes a honeycomb object like the conventional example, and a corrugated plate. Moreover, by the peripheral face [ of a honeycomb object ] and end side of an outer case carrying out soldering junction, since laser welding has fixed, one [ at least ] end face of a honeycomb object can make soldering junction of the part of several layers unnecessary from the outermost layer of drum of a honeycomb object, and the cost cut of wax material can be aimed at so much. Moreover, diffused junction can be made unnecessary in order to fix the interior of a honeycomb object.

[0030] Furthermore, soldering junction only of the peripheral face and outer case of a honeycomb object is carried out, the outer case is always cooled by outer air, and since temperature is low more nearly substantially than the temperature inside the honeycomb object which went up with exhaust gas, the oxidation resistance of the soldering section of an outer case and a honeycomb object can be prevented.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the perspective view of the metal honeycomb support concerning the example of this invention.

[Drawing 2] It is drawing of longitudinal section of this metal honeycomb support.

[Drawing 3] It is process drawing showing the manufacture method of construction of the metal honeycomb support concerning the example of this invention.

[Drawing 4] It is the perspective view of the metal honeycomb support in the former.

[Description of Notations]

1 Metal Honeycomb Support

2 Honeycomb Object

2A Front end side (one end face)

2C Peripheral face

3A End side

4 Plate

5 Corrugated Plate

R High-temperature-service wax material

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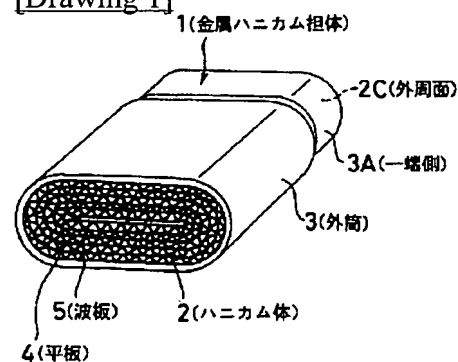
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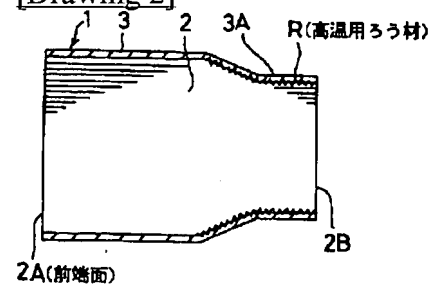
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## DRAWINGS

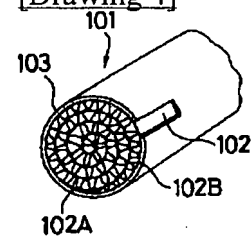
[Drawing 1]



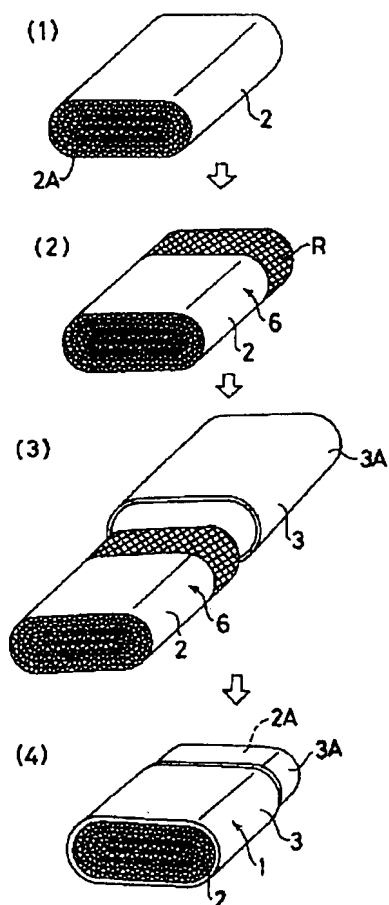
[Drawing 2]



[Drawing 4]



[Drawing 3]



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# EUROPEAN PATENT OFFICE

## Patent Abstracts of Japan

PUBLICATION NUMBER : 07024332  
PUBLICATION DATE : 27-01-95

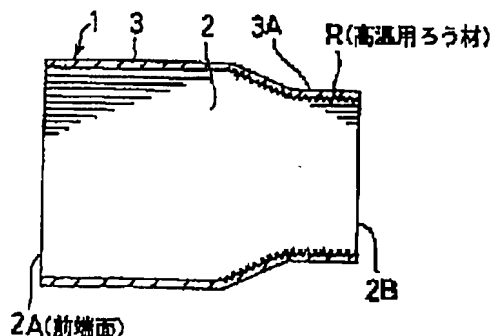
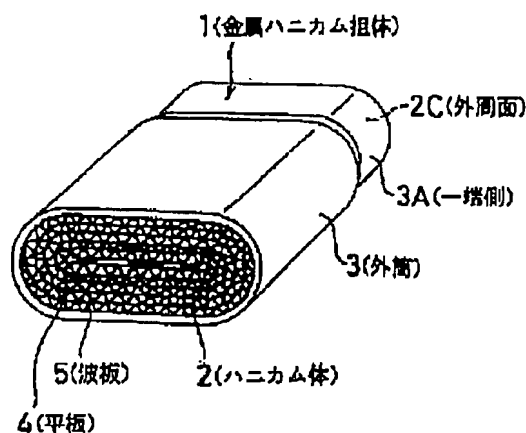
APPLICATION DATE : 12-07-93  
APPLICATION NUMBER : 05171877

APPLICANT : CALSONIC CORP;

INVENTOR : SUYAMA EIZO;

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F01N 3/28 F01N 3/28 F01N 3/28

TITLE : METAL HONEYCOMB CARRIER AND  
PRODUCTION THEREOF



ABSTRACT : PURPOSE: To prevent the occurrence of buckling in the flat plates and corrugated plates forming a honeycomb member by reducing the compression force in a diameter direction at the time of squeezing by squeezing one end part of an outer cylinder and closely bonding the outer peripheral surface of the honeycomb member and one end part of the outer cylinder to solder both of them.

CONSTITUTION: A catalyst converter for purifying exhaust gas is arranged to the exhaust system of a car. The metal honeycomb carrier 1 of the catalyst converter is formed by inserting a honeycomb member 2 wherein metal flat plates 4 and metal corrugated plates 5 are alternately wound in an outer cylinder 3 and bonding the outer peripheral surface 2C of the honeycomb member 2 and the outer cylinder 3. In this case, the flat plates 4 and corrugated plates 5 at least at one end surface 2A of the honeycomb member 2 are integrated by laser welding. One end part 3A of the outer cylinder 3 having the honeycomb member 2 provided thereto is squeezed and the outer peripheral surface 2C of the honeycomb member 2 and one end part 3A of the outer cylinder 3 are soldered by a high temp. solder material R. By this constitution, when one end part 3A of the outer cylinder 3 is squeezed, the compression force in the diameter direction of the outer cylinder is reduced.

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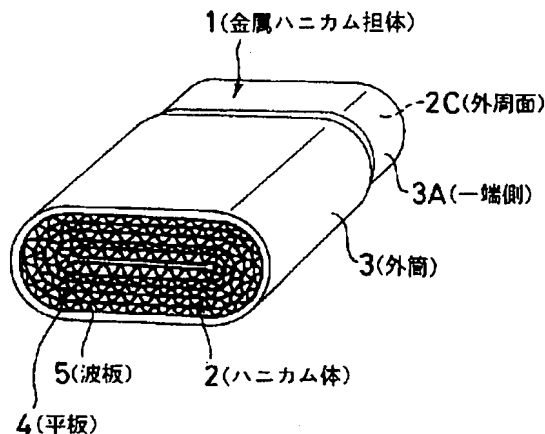
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(54) 【発明の名称】 金属ハニカム担体及びその製造工法

(57) 【要約】

【目的】 本発明は、例えば自動車の排気ガス等を浄化するために用いられる金属ハニカム担体及びその製造工法に関し、外筒の一端側を絞る際、径方向の圧縮力を小さくしてハニカム体を構成する平板、波板に座屈が発生することを防止するとともにハニカム体の内部をろう付け接合しないで接合することができ、さらに、ハニカム体の最外層から数層の耐酸化性を向上させることを目的とする。

【構成】 ハニカム体2の少なくとも一方の端面2Aにおける平板4、波板5をレーザー溶接で一体化するとともに、ハニカム体2上に被せられた外筒3の一端側3Aを絞って、高温ろう材Rによりハニカム体2の外周面2Cと外筒3の一端側3Aをろう付け接合してなる。



1

## 【特許請求の範囲】

【請求項1】 金属製の平板(4)と波板(5)を交互に巻き回してなるハニカム体(2)を、外筒(3)内に挿入し、

ハニカム体(2)の外周面(2C)と外筒(3)を接合してなる金属ハニカム担体において、

ハニカム体(2)の少なくとも一方の端面(2A)における平板(4)、波板(5)をレーザ溶接で一体化するとともに、

ハニカム体(2)上に被せられた外筒(3)の一端側(3A)を絞って、高温用ろう材(R)によりハニカム体(2)の外周面(2C)と外筒(3)の一端側(3A)をろう付け接合してなることを特徴とする金属ハニカム担体。

【請求項2】 金属製の平板(4)と波板(5)を交互に巻き回してなるハニカム体(2)の一端側(3A)に高温用ろう材(R)を環着して、外筒(3)内に挿入し、

外筒(3)の一端側(3A)を絞って縮径した後、

外筒(3)の一端側(3A)とハニカム体(2)の外周面(2C)をろう付け接合し、

ハニカム体(2)と外筒(3)の前記ろう付け工程の前工程または後工程で、ハニカム体(2)の少なくとも一方の端面(2A)における平板(4)、波板(5)をレーザ溶接で一体化することを特徴とする金属ハニカム担体の製造工法。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、例えば自動車の排気ガス等を浄化するために用いられる金属ハニカム担体及びその製造工法に関する。

【0002】

【従来の技術】一般に、自動車の排気系には、排気ガスを浄化するため、触媒コンバータが配置されている。

【0003】触媒コンバータの金属ハニカム担体として例えば特公昭2-14747号公報に示すものが図4に示すように知られている。図において、符号101は金属ハニカム担体で、この金属ハニカム担体101は、ハニカム体102と、このハニカム体102を入れる外筒103とから構成されている。

【0004】ハニカム体102は、金属製の平板102Aと波板102Bを交互に巻き回してなり、円柱状に構成されている。そして、上記金属ハニカム担体101を製造するに当たり、先ず、ハニカム体102を、外筒103内に挿入し、その後、外筒103の外周をダイス等により絞り、しかる後、高温に加熱して拡散接合により、ハニカム体102の外周面と外筒103が一体化され、且つ、ハニカム体102の内部が一体化される。

【0005】

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【発明が解決しようとする課題】ところが、従来の金属ハニカム担体101にあっては、外筒103を絞り込んでハニカム体102を構成する平板102A、波板102Bを拡散接合させるためには、径方向の圧縮力を大きくする必要がある。そこで、例えば、外筒103の絞り代を大きくすると、ハニカム体102自体に座屈が発生し、外筒102とハニカム体101の接触面積が減り、その接合強度が低下することになる。従って、径方向の圧縮力を大きくことは困難となる。

【0006】上述の従来例では、拡散接合によって、ハニカム体の外周面と外筒間の接合、及び、ハニカム体内部の平板、波板の一体化が図られているが、上述の問題があるため、例えば、ろう付け接合を利用したものが、例えば、特開平2-187151号公報に示すように知られている。

【0007】この公報に示す金属ハニカム担体は、ハニカム体と外筒との接触部並びにハニカム体の最外周及びその近傍の層合わせて数層の平板と波板との接触部をろう付けし、ハニカム体の残りの層の平板と波板との接触部を拡散接合してなるものである。

【0008】かかる金属ハニカム担体にあっては、ハニカム体の最外層から数層まで、ろう付け接合が必要になり、それだけ、ろう材のコストアップを招くことになる。また、平板、波板に含まれるアルミニウムが高温用ろう材の中に拡散して希釈され、高温条件下でのハニカム体の最外層から数層の耐酸化性は悪化することになる。

【0009】本発明は、上述の問題点を解決するためになされたもので、その目的は、外筒の一端側を絞る際、径方向の圧縮力を小さくしてハニカム体を構成する平板、波板に座屈が発生することを防止するとともにハニカム体の内部をろう付け接合しないで接合することができ、さらに、ハニカム体の最外層から数層の耐酸化性を向上させることができる金属ハニカム担体及びその製造工法を提供することである。

【0010】

【課題を解決するための手段】請求項1記載の発明は、金属製の平板と波板を交互に巻き回してなるハニカム体を、外筒内に挿入し、ハニカム体の外周面と外筒を接合してなる金属ハニカム担体において、ハニカム体の少なくとも一方の端面における平板、波板をレーザ溶接で一体化するとともに、ハニカム体上に被せられた外筒の一端側を絞って、高温用ろう材によりハニカム体の外周面と外筒の一端側をろう付け接合してなることを特徴とする。

【0011】請求項2記載の発明は、金属製の平板と波板を交互に巻き回してなるハニカム体の一端側に高温用ろう材を環着して、外筒内に挿入し、外筒の一端側を絞って縮径した後、外筒の一端側とハニカム体の外周面をろう付け接合し、ハニカム体と外筒の前記ろう付け工程

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の前工程または後工程で、ハニカム体の少なくとも一方の端面における平板、波板をレーザ溶接で一体化することを特徴とする。

【0012】

【作用】以上説明したように本発明によれば、外筒の軸方向の一端側を絞ることにより、ハニカム体の外周面と外筒の一端側を密着させた状態でろう付け接合がなされるので、絞り加工による外筒の縮径の度合いは、ハニカム体の外周面と外筒を密着させる程度で充分であり、ハニカム体を構成する平板、波板を拡散接合させる程、外筒を絞り込む必要はなく、絞り加工の際の径方向の圧縮力が小さくなる。

【0013】

【実施例】以下、図面により本発明の実施例について説明する。図1、図2は本発明の実施例に係わる金属ハニカム担体を示す。図において、符号1は本実施例に係わる金属ハニカム担体で、この金属ハニカム担体1は、ハニカム体2と、ハニカム体2を挿入する外筒3とで構成されている。金属ハニカム担体1の両端には、それぞれディフューザ（図示せず）が結合され、触媒コンバータ（図示せず）を構成している。

【0014】ハニカム体2は 金属製の平板4と波板5を交互に巻き回してなり、楕円柱状に構成されている。その最外層は平板4となっている。外筒3は、例えばSUS430のようなフェライト系ステンレス鋼合金からなる合金を材料としており、その板厚は約1.5～2mmとされている。

【0015】平板4、波板5は、Cr20%、Al（アルミニウム）5%を含有するフェライト系ステンレス鋼合金を材料としており、その板厚は約50μmとされている。

【0016】ハニカム体2の前端面における平板4、波板5はレーザ溶接で固着して一体化されている。これにより、ハニカム体2のフィルムアウト現象を防止できる。そして、ハニカム体2上に被せられた外筒3の一端側3A（ハニカム体2の後端面2Bから略中央部分まで）を絞ることにより縮径した状態で、（ハニカム体2の外周面2Cと外筒3の一端側3Aを密着させた状態で、）Niろう箔材からなる高温用ろう材Rによりハニカム体2の外周面2Cと外筒3の一端側3Aはろう付け接合されている。

【0017】次に、上記の如き構成の金属ハニカム担体2の製造工法について図3により説明する。まず、最初に、ステップ（1）において、金属製の平板4と波板5を交互に巻き回してなるハニカム体2を準備する。この時、ハニカム体2の前端面2Aにおける平板4、波板5は、レーザ溶接で固着して一体化されている。

【0018】ステップ（2）において、ハニカム体2の一端側にNiろう箔材からなる高温用ろう材Rが巻き込まれて第1中間体6が得られる。ステップ（3）におい

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て、この第1中間体6を外筒3内に挿入し、外筒3の一端側3Aをダイス等の機械的手段によって絞って縮径した後、加熱炉に入れて高温熱処理を施すと、ステップ（4）に示すように、外筒3の一端側3Aとハニカム体2の外周面2Cがろう付け接合される。

【0019】以上の如き構成によれば、外筒3の一端側3Aを絞ることにより、ハニカム体2の外周面2Cと外筒3の一端側3Aを密着させた状態でろう付け接合がなされるので、絞り加工による外筒3の一端側3Aの縮径の度合いは、ハニカム体2の外周面2Cと外筒3の一端側3Aを密着させる程度で充分であり、ハニカム体2を構成する平板4、波板5を拡散接合させる程、外筒3の一端側3Aを絞り込む必要はなく、径方向の圧縮力を小さくすることができる。

【0020】従って、従来例のようにハニカム体2を構成する平板4、波板5に座屈が発生することを防止することができる。また、ハニカム体2の外周面2Cと外筒3の一端側3Aがろう付け接合され、且つ、ハニカム体2の前端面2Aがレーザ溶接が固着されているので、ハニカム体2の最外層から数層の部分のろう付け接合を不要にでき、それだけ、ろう材のコストダウンを図ることができる。また、ハニカム体2の内部を固着するために拡散接合を不要にすることができる。

【0021】さらに、一般のろう付け接合では、ハニカム体の平板、波板に含まれるアルミニウムが高温用ろう材Rの中に拡散して希釈され、特に、ハニカム体の最外層から数層は、高温条件下での耐酸化性は悪化する。

【0022】本実施例では、ハニカム体2の外周面2Cと外筒3のみがろう付け接合されており、外筒3は外の空気により常時冷却されており、排気ガスで上昇したハニカム体2内部の温度より大幅に温度が低くなっているため、外筒3とハニカム体2のろう付け部の耐酸化性を防止できる。

【0023】そして、ハニカム体2の外周面2Cと外筒3がろう付け接合されているので、ハニカム体2の外周面2Cと外筒3の間に隙間が生じる余地がなく、排気ガスのバイパス防止を図ることができる。

【0024】なお、本実施例においては、ハニカム体2の前端面2Aにおける平板4、波板5はレーザ溶接で固着して一体化されているが、後端面2Bにおける平板4、波板5はレーザ溶接で固着して一体化することもでき、また、前後端面2A、2Bにおける平板4、波板5をレーザ溶接でそれぞれ固着して一体化することもできる。

【0025】また、本実施例においては、ハニカム体2と外筒3の前記ろう付け工程の前工程で、ハニカム体2の内部はレーザ溶接されているが、ろう付け工程の後工程でレーザ溶接をすることもできる。

【0026】さらに、本実施例においては、ハニカム体2の最外層は平板4となっているが、凹凸の小さい小波

板5をハニカム体2の最外層にすることもできる。そして、本実施例においては、平板4、波板5は、Cr20%、Al（アルミニウム）5%を含有するフェライト系ステンレス鋼合金を材料としており、その板厚は約50 $\mu$ mとされているが、かかる数値に限定されことなく、例えば、平板4、波板5を、Cr18%、Al（アルミニウム）3%を含有して板厚約30 $\mu$ mのフェライト系ステンレス鋼合金等のアルミニウム含有フェライト系ステンレス鋼合金とすることができる。

【0027】そして、また、本実施例においては、外筒3はフェライト系ステンレス鋼合金であればどのような種類のもでも使用可能であるが、上述したSUS430のように加熱により拡散し易い金属を含まない合金が好ましい。耐熱性が良好であってもAl（アルミニウム）を含むステンレス合金は、加熱によりAl（アルミニウム）がろう材中に拡散してろう付け強度を低下させることがあるので、使用時には注意が必要とされる。

【0028】

【発明の効果】以上説明したように、本発明によれば、外筒の一端側を絞ることにより、ハニカム体の外周面と外筒の一端側を密着させた状態でろう付け接合がなされるので、絞り加工による外筒の一端側の縮径の度合いは、ハニカム体の外周面と外筒の一端側を密着させる程度で充分であり、ハニカム体を構成する平板、波板を拡散接合させる程、外筒の一端側を絞り込む必要はなく、径方向の圧縮力を小さくすることができる。

【0029】従って、従来例のようにハニカム体を構成する平板、波板に座屈が発生することを防止することができる。また、ハニカム体の外周面と外筒の一端側がろう

\*う付け接合し、且つ、ハニカム体の少なくとも一方の端面がレーザ溶接が固着されているので、ハニカム体の最外層から数層の部分のろう付け接合を不要にでき、それだけ、ろう材のコストダウンを図ることができる。また、ハニカム体の内部を固着するために拡散接合を不要にすることができる。

【0030】さらに、ハニカム体の外周面と外筒のみがろう付け接合されており、外筒は外の空気により常時冷却されており、排気ガスで上昇したハニカム体内部の温度より大幅に温度が低くなっているため、外筒とハニカム体のろう付け部の耐酸化性を防止できる。

【図面の簡単な説明】

【図1】本発明の実施例に係わる金属ハニカム担体の斜視図である。

【図2】同金属ハニカム担体の縦断面図である。

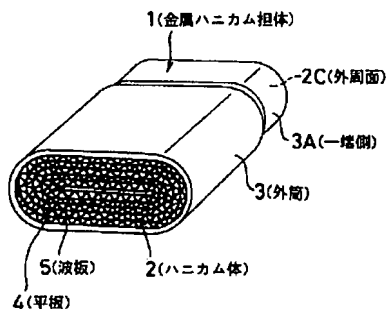
【図3】本発明の実施例に係わる金属ハニカム担体の製造工法を示す工程図である。

【図4】従来における金属ハニカム担体の斜視図である。

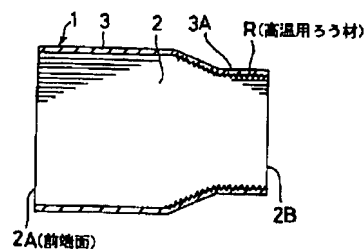
【符号の説明】

- 1 金属ハニカム担体
- 2 ハニカム体
- 2A 前端面（一方の端面）
- 2C 外周面
- 3A 一端側
- 4 平板
- 5 波板
- R 高温用ろう材

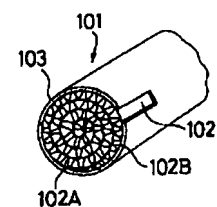
【図1】



【図2】

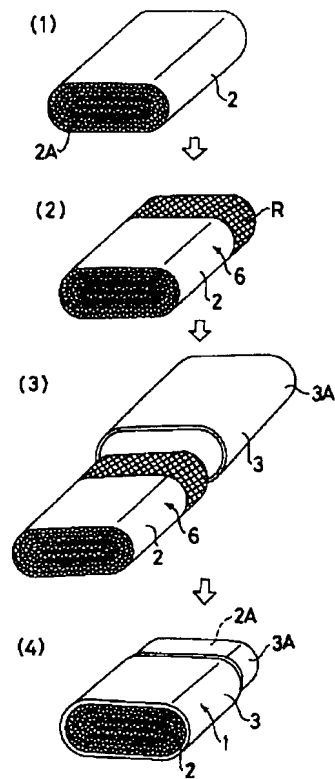


【図4】





【図3】



フロントページの続き

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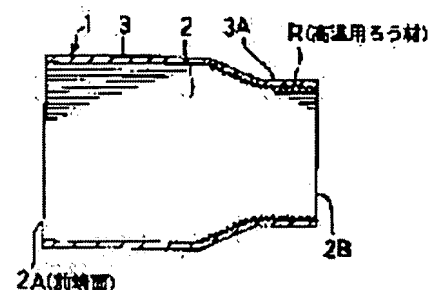
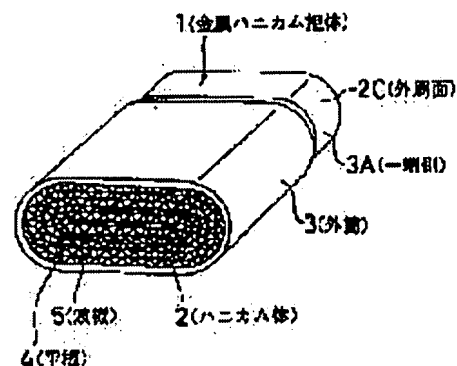
SUYAMA EIZO

## (54) METAL HONEYCOMB CARRIER AND PRODUCTION THEREOF

(57)Abstract:

**PURPOSE:** To prevent the occurrence of buckling in the flat plates and corrugated plates forming a honeycomb member by reducing the compression force in a diameter direction at the time of squeezing by squeezing one end part of an outer cylinder and closely bonding the outer peripheral surface of the honeycomb member and one end part of the outer cylinder to solder both of them.

**CONSTITUTION:** A catalyst converter for purifying exhaust gas is arranged to the exhaust system of a car. The metal honeycomb carrier 1 of the catalyst converter is formed by inserting a honeycomb member 2 wherein metal flat plates 4 and metal corrugated plates 5 are alternately wound in an outer cylinder 3 and bonding the outer peripheral surface 2C of the honeycomb member 2 and the outer cylinder 3. In this case, the flat plates 4 and corrugated plates 5 at least at one end surface 2A of the honeycomb member 2 are integrated by laser welding. One end part 3A of the outer cylinder 3 having the honeycomb member 2 provided thereto is squeezed and the



outer peripheral surface 2C of the honeycomb member 2 and one end part 3A of the outer cylinder 3 are soldered by a high temp. solder material R. By this constitution, when one end part 3A of the outer cylinder 3 is squeezed, the compression force in the diameter direction of the outer cylinder is reduced.

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## LEGAL STATUS

[Date of request for examination]

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[Date of registration]

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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

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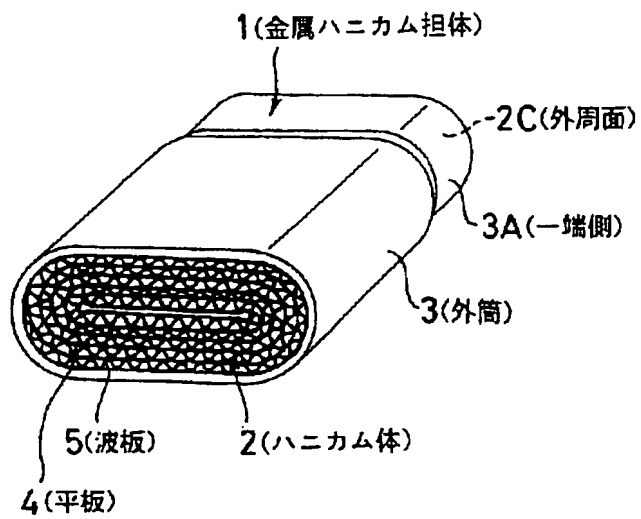
[Claim(s)]

[Claim 1] In the metal honeycomb support which inserts the honeycomb object (2) rolls a metal plate (4) and a metal corrugated plate (5) by turns, and they come to carry out a time into an outer case (3), and comes to join the peripheral face (2C) and outer case (3) of a honeycomb object (2) While unifying the plate (4) in one [ at least ] end face (2A) of a honeycomb object (2), and a corrugated plate (5) by laser welding Metal honeycomb support characterized by extracting the end side (3A) of the outer case (3) put on the honeycomb object (2), and coming to carry out soldering junction of the peripheral face (2C) side of a honeycomb object (2), and the end side (3A) of an outer case (3) by high-temperature-service wax material (R).

[Claim 2] Ring arrival of the high-temperature-service wax material (R) is carried out to the end side (3A) of the honeycomb object (2) which rolls a metal plate (4) and a metal corrugated plate (5) by turns, and comes to carry out a time. After inserting into an outer case (3) and extracting and reducing the diameter of the end side (3A) of an outer case (3), Soldering junction of the peripheral face (2C) of a honeycomb object (2) is carried out the end side (3A) of an outer case (3). At the last process of said soldering process or back process of a honeycomb object (2) and an outer case (3) The manufacture method of construction of the metal honeycomb support characterized by unifying the plate (4) in one [ at least ] end face (2A) of a honeycomb object (2), and a corrugated plate (5) by laser welding.

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[Translation done.]

Drawing selection **Representative drawing** ☒

[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the metal honeycomb support used in order to purify the exhaust gas of an automobile etc., and its manufacture method of construction.

[0002]

[Description of the Prior Art] Generally, in order to purify exhaust gas, for the reason, the catalytic converter is arranged at the exhaust air system of an automobile.

[0003] It is known as what is shown in JP,2-14747,B as metal honeycomb support of a catalytic converter shows drawing 4. In drawing, a sign 101 is metal honeycomb support and this metal honeycomb support 101 consists of a honeycomb object 102 and an outer case 103 into which this honeycomb object 102 is put.

[0004] Roll metal plate 102A and corrugated plate 102B by turns, and the honeycomb object 102 comes to carry out a time, and is constituted in the shape of a cylinder. And in manufacturing the above-mentioned metal honeycomb support 101, first, the honeycomb object 102 is inserted into an outer case 103, and the periphery of an outer case 103 is extracted with a dice etc. after that, it heats to an elevated temperature after an appropriate time, and the peripheral face and outer case 103 of the honeycomb object 102 are unified by diffused junction, and the interior of the honeycomb object 102 is unified.

[0005]

[Problem(s) to be Solved by the Invention] However, if it is in the conventional metal honeycomb support 101, in order to carry out diffused junction of plate 102A which narrows down an outer case 103 and constitutes the honeycomb object 102, and the corrugated plate 102B, it is necessary to enlarge compressive force of the direction of a path. When the drawing cost of an outer case 103 is enlarged, a buckling will occur in honeycomb object 102 the very thing, the touch area of an outer case 102 and the honeycomb object 101 will decrease, and the bonding strength will fall there. Therefore, it becomes it is large and difficult [ things ] about the compressive force of the direction of a path.

[0006] Although unification of the peripheral face of a honeycomb object, the junction between outer cases and the plate inside a honeycomb object, and a corrugated plate is attained by diffused junction, since there is an above-mentioned problem, the thing using soldering junction is known for the above-mentioned conventional example as shown in JP,2-187151,A.

[0007] The metal honeycomb support shown in this official report solders the outermost periphery of a honeycomb object, and the contact section of the plate of the several layers layer of that near in all, and a corrugated plate in the contact section list of a honeycomb object and an outer case, and comes to carry out diffused junction of the contact section of the plate of the remaining layers of a honeycomb object, and a corrugated plate.

[0008] If it is in this metal honeycomb support, from the outermost layer of drum of a honeycomb object to several layers, soldering junction will be needed and the cost rise of wax material will be caused so much. Moreover, in high-temperature-service wax material, the aluminum contained in a plate and a corrugated plate will be spread, and will be diluted, and the oxidation resistance of several layers will

get worse from the outermost layer of drum of the honeycomb object under a high temperature service. [0009] It is what was made in order that this invention might solve an above-mentioned trouble. The object It can join without carrying out soldering junction of the interior of a honeycomb object, while preventing that a buckling occurs in the plate which makes compressive force of the direction of a path small, and constitutes a honeycomb object, and a corrugated plate in case the end side of an outer case is extracted. Furthermore, it is offering the metal honeycomb support which can raise the oxidation resistance of several layers from the outermost layer of drum of a honeycomb object, and its manufacture method of construction.

[0010]

[Means for Solving the Problem] In the metal honeycomb support which invention according to claim 1 inserts the honeycomb object rolls a metal plate and a metal corrugated plate by turns, and they come to carry out a time into an outer case, and comes to join the peripheral face and outer case of a honeycomb object While unifying the plate in one [ at least ] end face of a honeycomb object, and a corrugated plate by laser welding, it is characterized by extracting the end side of the outer case put on the honeycomb object, and coming to carry out soldering junction of the peripheral face side of a honeycomb object, and the end side of an outer case by high-temperature-service wax material.

[0011] Invention according to claim 2 carries out ring arrival of the high-temperature-service wax material to the end side of the honeycomb object which rolls a metal plate and a metal corrugated plate by turns, and comes to carry out a time. It inserts into an outer case, and after extracting and reducing the diameter of the end side of an outer case, soldering junction of the peripheral face of a honeycomb object is carried out the end side of an outer case. At the process before said soldering process of a honeycomb object and an outer case, or an after process It is characterized by unifying the plate in one [ at least ] end face of a honeycomb object, and a corrugated plate by laser welding.

[0012]

[Function] Since soldering junction is made according to this invention where the peripheral face [ of a honeycomb object ] and end side of an outer case is stuck by extracting the end side of the shaft orientations of an outer case as explained above Extent to which the peripheral face and outer case of a honeycomb object are stuck is enough as the degree of diameter reduction of the outer case by spinning, it is not necessary to narrow down an outer case and the compressive force of the direction of a path in the case of spinning becomes small, so that diffused junction of the plate and corrugated plate which constitute a honeycomb object is carried out.

[0013]

[Example] Hereafter, a drawing explains the example of this invention. Drawing 1 and drawing 2 show the metal honeycomb support concerning the example of this invention. In drawing, a sign 1 is the metal honeycomb support concerning this example, and this metal honeycomb support 1 consists of a honeycomb object 2 and an outer case 3 which inserts the honeycomb object 2. In the ends of the metal honeycomb support 1, a diffuser (not shown) is combined, respectively and the catalytic converter (not shown) is constituted.

[0014] Honeycomb object 2 Roll a metal plate 4 and a metal corrugated plate 5 by turns, they come to carry out a time, and it is constituted in the shape of an elliptic cylinder. The outermost layer of drum serves as a plate 4. The outer case 3 is made from the alloy which consists of a ferritic-stainless-steel alloy like SUS430, and the board thickness is set to about 1.5-2mm.

[0015] The plate 4 and the corrugated plate 5 are made from the ferritic-stainless-steel alloy containing Cr20% and aluminum(aluminum)5%, and the board thickness is set to about 50 micrometers.

[0016] By laser welding, the plate 4 in the front end side of the honeycomb object 2 and a corrugated plate 5 fix, and are unified. Thereby, the film out phenomenon of the honeycomb object 2 can be prevented. And where the diameter is reduced by extracting end side 3A of the outer case 3 put on the honeycomb object 2 (from back end side 2B of the honeycomb object 2 to a part for an abbreviation center section) (in the condition of having stuck end side 3A of peripheral face 2C of the honeycomb object 2, and an outer case 3) Soldering junction of the end side 3A of peripheral face 2C of the honeycomb object 2 and an outer case 3 is carried out by the high-temperature-service wax material R

which consists of nickel wax foil material.

[0017] Next, drawing 3 explains the manufacture method of construction of the metal honeycomb support 2 of a configuration like the above. First, in a step (1), the honeycomb object 2 rolls a metal plate 4 and a metal corrugated plate 5 by turns, and they come to carry out a time is prepared. At this time, by laser welding, the plate 4 in front end side 2A of the honeycomb object 2 and a corrugated plate 5 fix, and are unified.

[0018] In a step (2), the high-temperature-service wax material R which is from nickel wax foil material on the end side of the honeycomb object 2 is involved in, and the 1st intermediate field 6 are obtained. In a step (3), this 1st intermediate field 6 are inserted into an outer case 3, and if it puts into a heating furnace and elevated-temperature heat treatment is performed after extracting and reducing the diameter of end side 3A of an outer case 3 by the mechanical means of a dice etc., as shown in a step (4), soldering junction of peripheral face 2C of end side 3A of an outer case 3 and the honeycomb object 2 will be carried out.

[0019] Since according to the configuration like \*\*\*\* soldering junction is made where end side 3A of peripheral face 2C of the honeycomb object 2 and an outer case 3 is stuck by extracting end side 3A of an outer case 3 The degree of diameter reduction of end side 3A of the outer case 3 by spinning Extent to which end side 3A of peripheral face 2C of the honeycomb object 2 and an outer case 3 is stuck is enough, it is not necessary to narrow down end side 3A of an outer case 3, and compressive force of the direction of a path can be made small, so that diffused junction of the plate 4 and corrugated plate 5 which constitute the honeycomb object 2 is carried out.

[0020] Therefore, it can prevent that a buckling occurs in the plate 4 which constitutes the honeycomb object 2 like the conventional example, and a corrugated plate 5. Moreover, by carrying out soldering junction of the end side 3A of peripheral face 2C of the honeycomb object 2, and an outer case 3, since laser welding has fixed, front end side 2A of the honeycomb object 2 can make soldering junction of the part of several layers unnecessary from the outermost layer of drum of the honeycomb object 2, and the cost cut of wax material can be aimed at so much. Moreover, diffused junction can be made unnecessary in order to fix the interior of the honeycomb object 2.

[0021] Furthermore, in the high-temperature-service wax material R, the aluminum contained in the plate of a honeycomb object and a corrugated plate is spread, and is diluted with general soldering junction, and, in several layers, especially the oxidation resistance under a high temperature service gets worse from the outermost layer of drum of a honeycomb object.

[0022] In this example, since temperature is low more nearly substantially than the temperature of the honeycomb object 2 interior where soldering junction is carried out, the outer case 3 is always cooled by outer air, and only peripheral face 2C and the outer case 3 of the honeycomb object 2 went up with exhaust gas, it curses honeycomb object 2 with an outer case 3, and the oxidation resistance of the section can be prevented.

[0023] And since soldering junction of peripheral face 2C and the outer case 3 of the honeycomb object 2 is carried out, there is no room to generate a clearance between peripheral face 2C of the honeycomb object 2 and an outer case 3, and bypass prevention of exhaust gas can be aimed at.

[0024] In addition, in this example, although fixed and unified by laser welding, the plate 4 in front end side 2A of the honeycomb object 2 and a corrugated plate 5 can also be fixed and unified by laser welding, and the plate 4 in back end side 2B and a corrugated plate 5 can fix order end-face 2A, the plate 4 in 2B, and a corrugated plate 5 by laser welding, respectively, and can also unify them.

[0025] Moreover, in this example, although it is a process before said soldering process of the honeycomb object 2 and an outer case 3 and laser welding of the interior of the honeycomb object 2 is carried out, laser welding can also be carried out at an after [ a soldering process ] process.

[0026] Furthermore, in this example, although the outermost layer of drum of the honeycomb object 2 serves as a plate 4, it can also make the short pitch corrugated sheet 5 with small irregularity the outermost layer of drum of the honeycomb object 2. And although the plate 4 and the corrugated plate 5 are made from the ferritic-stainless-steel alloy containing Cr20% and aluminum(aluminum)5% in this example and the board thickness is set to about 50 micrometers Without being limited to this numeric



value, Cr18% and aluminum(aluminum)3% are contained and a plate 4 and a corrugated plate 5 can be used as aluminum content ferritic-stainless-steel alloys, such as a ferritic-stainless-steel alloy of about 30 micrometers of board thickness, for example.

[0027] And although what kind of its thing is also usable in this example again if an outer case 3 is a ferritic-stainless-steel alloy, the alloy which does not contain the metal which is easy to diffuse with heating like SUS430 mentioned above is desirable. Since aluminum (aluminum) diffuses with heating the stainless alloy which contains aluminum (aluminum) even if thermal resistance is good in wax material, I will shine and reinforcement may be reduced, caution is needed at the time of an activity.

[0028]

[Effect of the Invention] Since soldering junction is made according to this invention where the peripheral face [ of a honeycomb object ] and end side of an outer case is stuck by extracting the end side of an outer case as explained above Extent to which the peripheral face [ of a honeycomb object ] and end side of an outer case is stuck is enough as the degree of diameter reduction by the side of the end of the outer case by spinning, and it does not need to narrow down the end side of an outer case and can make compressive force of the direction of a path small, so that diffused junction of the plate and corrugated plate which constitute a honeycomb object is carried out.

[0029] Therefore, it can prevent that a buckling occurs in the plate which constitutes a honeycomb object like the conventional example, and a corrugated plate. Moreover, by the peripheral face [ of a honeycomb object ] and end side of an outer case carrying out soldering junction, since laser welding has fixed, one [ at least ] end face of a honeycomb object can make soldering junction of the part of several layers unnecessary from the outermost layer of drum of a honeycomb object, and the cost cut of wax material can be aimed at so much. Moreover, diffused junction can be made unnecessary in order to fix the interior of a honeycomb object.

[0030] Furthermore, soldering junction only of the peripheral face and outer case of a honeycomb object is carried out, the outer case is always cooled by outer air, and since temperature is low more nearly substantially than the temperature inside the honeycomb object which went up with exhaust gas, the oxidation resistance of the soldering section of an outer case and a honeycomb object can be prevented.

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[Translation done.]

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the perspective view of the metal honeycomb support concerning the example of this invention.

[Drawing 2] It is drawing of longitudinal section of this metal honeycomb support.

[Drawing 3] It is process drawing showing the manufacture method of construction of the metal honeycomb support concerning the example of this invention.

[Drawing 4] It is the perspective view of the metal honeycomb support in the former.

[Description of Notations]

1 Metal Honeycomb Support

2 Honeycomb Object

2A Front end side (one end face)

2C Peripheral face

3A End side

4 Plate

5 Corrugated Plate

R High-temperature-service wax material

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[Translation done.]

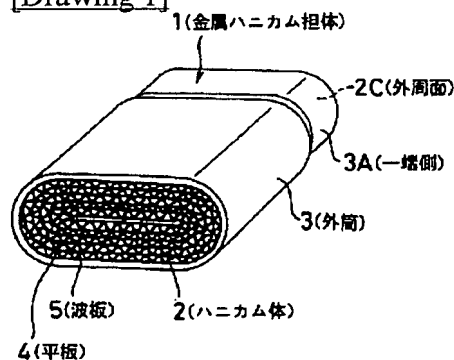
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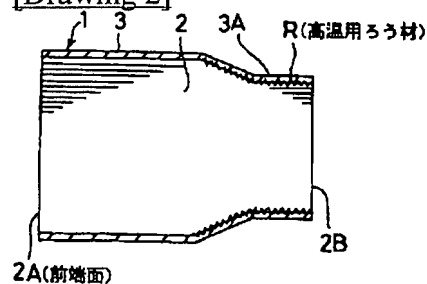
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## DRAWINGS

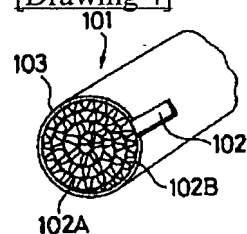
[Drawing 1]



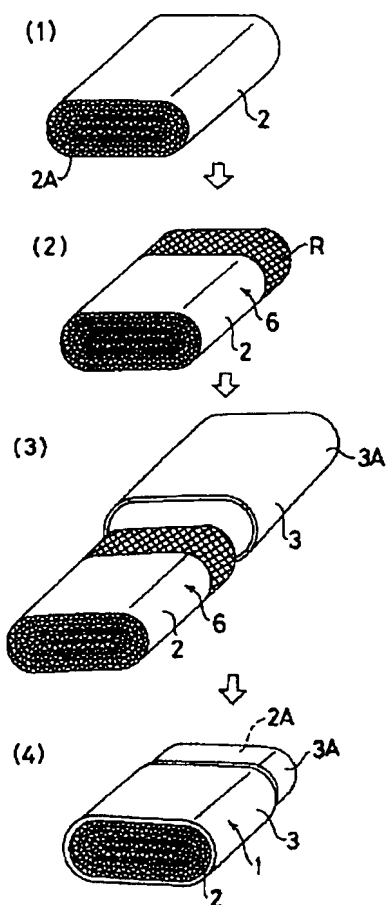
[Drawing 2]



[Drawing 4]



[Drawing 3]



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[Translation done.]

# EUROPEAN PATENT OFFICE

## Patent Abstracts of Japan

PUBLICATION NUMBER : 07024332  
PUBLICATION DATE : 27-01-95

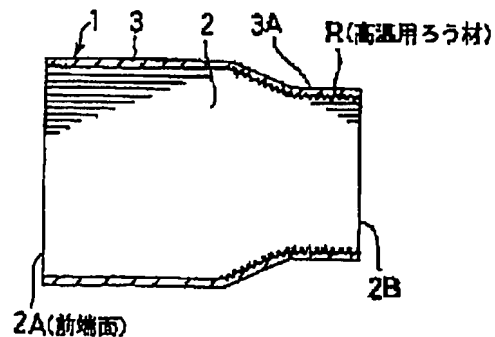
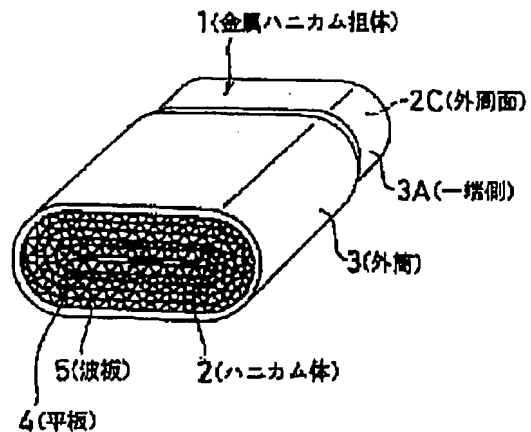
APPLICATION DATE : 12-07-93  
APPLICATION NUMBER : 05171877

APPLICANT : CALSONIC CORP;

INVENTOR : SUYAMA EIZO;

INT.CL. : B01J 35/04 B01J 35/04 B01J 35/04  
F01N 3/28 F01N 3/28 F01N 3/28

TITLE : METAL HONEYCOMB CARRIER AND  
PRODUCTION THEREOF



ABSTRACT : PURPOSE: To prevent the occurrence of buckling in the flat plates and corrugated plates forming a honeycomb member by reducing the compression force in a diameter direction at the time of squeezing by squeezing one end part of an outer cylinder and closely bonding the outer peripheral surface of the honeycomb member and one end part of the outer cylinder to solder both of them.

CONSTITUTION: A catalyst converter for purifying exhaust gas is arranged to the exhaust system of a car. The metal honeycomb carrier 1 of the catalyst converter is formed by inserting a honeycomb member 2 wherein metal flat plates 4 and metal corrugated plates 5 are alternately wound in an outer cylinder 3 and bonding the outer peripheral surface 2C of the honeycomb member 2 and the outer cylinder 3. In this case, the flat plates 4 and corrugated plates 5 at least at one end surface 2A of the honeycomb member 2 are integrated by laser welding. One end part 3A of the outer cylinder 3 having the honeycomb member 2 provided thereto is squeezed and the outer peripheral surface 2C of the honeycomb member 2 and one end part 3A of the outer cylinder 3 are soldered by a high temp. solder material R. By this constitution, when one end part 3A of the outer cylinder 3 is squeezed, the compression force in the diameter direction of the outer cylinder is reduced.

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	3 0 1 D	8017-4G		
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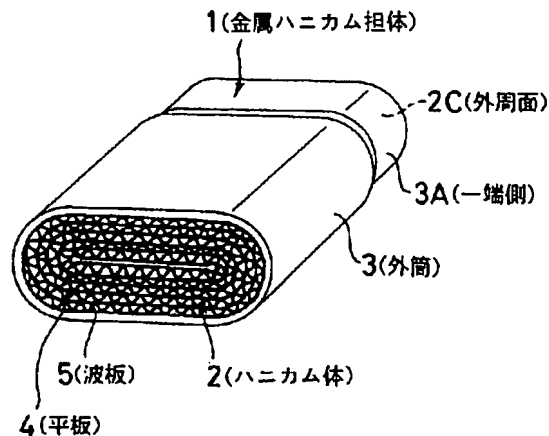
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(54) 【発明の名称】 金属ハニカム担体及びその製造工法

(57) 【要約】

【目的】 本発明は、例えば自動車の排気ガス等を浄化するために用いられる金属ハニカム担体及びその製造工法に関し、外筒の一端側を絞る際、径方向の圧縮力を小さくしてハニカム体を構成する平板、波板に座屈が発生することを防止するとともにハニカム体の内部をろう付け接合しないで接合することができ、さらに、ハニカム体の最外層から数層の耐酸化性を向上させることを目的とする。

【構成】 ハニカム体2の少なくとも一方の端面2Aにおける平板4、波板5をレーザ溶接で一体化するとともに、ハニカム体2上に被せられた外筒3の一端側3Aを絞って、高温用ろう材Rによりハニカム体2の外周面2Cと外筒3の一端側3Aをろう付け接合してなる。



## 【特許請求の範囲】

【請求項 1】 金属製の平板（４）と波板（５）を交互に巻き回してなるハニカム体（２）を、外筒（３）内に挿入し、

ハニカム体（２）の外周面（２Ｃ）と外筒（３）を接合してなる金属ハニカム担体において、ハニカム体（２）の少なくとも一方の端面（２Ａ）における平板（４）、波板（５）をレーザ溶接で一体化するとともに、

ハニカム体（２）上に被せられた外筒（３）の一端側（３Ａ）を絞って、高温用ろう材（Ｒ）によりハニカム体（２）の外周面（２Ｃ）と外筒（３）の一端側（３Ａ）をろう付け接合してなることを特徴とする金属ハニカム担体。

【請求項 2】 金属製の平板（４）と波板（５）を交互に巻き回してなるハニカム体（２）の一端側（３Ａ）に高温用ろう材（Ｒ）を環着して、外筒（３）内に挿入し、

外筒（３）の一端側（３Ａ）を絞って縮径した後、外筒（３）の一端側（３Ａ）とハニカム体（２）の外周面（２Ｃ）をろう付け接合し、

ハニカム体（２）と外筒（３）の前記ろう付け工程の前工程または後工程で、ハニカム体（２）の少なくとも一方の端面（２Ａ）における平板（４）、波板（５）をレーザ溶接で一体化することを特徴とする金属ハニカム担体の製造工法。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、例えば自動車の排気ガス等を浄化するために用いられる金属ハニカム担体及びその製造工法に関する。

【0002】

【従来の技術】一般に、自動車の排気系には、排気ガスを浄化するためため、触媒コンバータが配置されている。

【0003】触媒コンバータの金属ハニカム担体として例えば特公昭 2-14747 号公報に示すものが図 4 に示すように知られている。図において、符号 101 は金属ハニカム担体で、この金属ハニカム担体 101 は、ハニカム体 102 と、このハニカム体 102 を入れる外筒 103 とから構成されている。

【0004】ハニカム体 102 は、金属製の平板 102A と波板 102B を交互に巻き回してなり、円柱状に構成されている。そして、上記金属ハニカム担体 101 を製造するに当たり、まず、ハニカム体 102 を、外筒 103 内に挿入し、その後、外筒 103 の外周をダイス等により絞り、しかる後、高温に加熱して拡散接合により、ハニカム体 102 の外周面と外筒 103 が一体化され、且つ、ハニカム体 102 の内部が一体化される。

【0005】

【発明が解決しようとする課題】ところが、従来の金属ハニカム担体 101 にあっては、外筒 103 を絞り込んでハニカム体 102 を構成する平板 102A、波板 102B を拡散接合させるためには、径方向の圧縮力を大きくする必要がある。そこで、例えば、外筒 103 の絞り代を大きくすると、ハニカム体 102 自体に座屈が発生し、外筒 102 とハニカム体 101 の接触面積が減り、その接合強度が低下することになる。従って、径方向の圧縮力を大きくことは困難となる。

【0006】上述の従来例では、拡散接合によって、ハニカム体の外周面と外筒間の接合、及び、ハニカム体内部の平板、波板の一体化が図られているが、上述の問題があるため、例えば、ろう付け接合を利用したものが、例えば、特開平 2-187151 号公報に示すように知られている。

【0007】この公報に示す金属ハニカム担体は、ハニカム体と外筒との接触部並びにハニカム体の最外周及びその近傍の層合わせて数層の平板と波板との接触部をろう付けし、ハニカム体の残りの層の平板と波板との接触部を拡散接合してなるものである。

【0008】かかる金属ハニカム担体においては、ハニカム体の最外層から数層まで、ろう付け接合が必要になり、それだけ、ろう材のコストアップを招くことになる。また、平板、波板に含まれるアルミニウムが高温用ろう材の中に拡散して希釈され、高温条件下でのハニカム体の最外層から数層の耐酸化性は悪化することになる。

【0009】本発明は、上述の問題点を解決するためになされたもので、その目的は、外筒の一端側を絞る際、径方向の圧縮力を小さくしてハニカム体を構成する平板、波板に座屈が発生することを防止するとともにハニカム体の内部をろう付け接合しないで接合することができ、さらに、ハニカム体の最外層から数層の耐酸化性を向上させることができる金属ハニカム担体及びその製造工法を提供することである。

【0010】

【課題を解決するための手段】請求項 1 記載の発明は、金属製の平板と波板を交互に巻き回してなるハニカム体を、外筒内に挿入し、ハニカム体の外周面と外筒を接合してなる金属ハニカム担体において、ハニカム体の少なくとも一方の端面における平板、波板をレーザ溶接で一体化するとともに、ハニカム体上に被せられた外筒の一端側を絞って、高温用ろう材によりハニカム体の外周面と外筒の一端側をろう付け接合してなることを特徴とする。

【0011】請求項 2 記載の発明は、金属製の平板と波板を交互に巻き回してなるハニカム体の一端側に高温用ろう材を環着して、外筒内に挿入し、外筒の一端側を絞って縮径した後、外筒の一端側とハニカム体の外周面をろう付け接合し、ハニカム体と外筒の前記ろう付け工程

の前工程または後工程で、ハニカム体の少なくとも一方の端面における平板、波板をレーザ溶接で一体化することとを特徴とする。

【0012】

【作用】以上説明したように本発明によれば、外筒の軸方向の一端側を絞ることにより、ハニカム体の外周面と外筒の一端側を密着させた状態でろう付け接合がなされるので、絞り加工による外筒の縮径の度合いは、ハニカム体の外周面と外筒を密着させる程度で充分であり、ハニカム体を構成する平板、波板を拡散接合させる程、外筒を絞り込む必要はなく、絞り加工の際の径方向の圧縮力が小さくなる。

【0013】

【実施例】以下、図面により本発明の実施例について説明する。図1、図2は本発明の実施例に係わる金属ハニカム担体を示す。図において、符号1は本実施例に係わる金属ハニカム担体で、この金属ハニカム担体1は、ハニカム体2と、ハニカム体2を挿入する外筒3とで構成されている。金属ハニカム担体1の両端には、それぞれディフューザ（図示せず）が結合され、触媒コンバータ（図示せず）を構成している。

【0014】ハニカム体2は 金属製の平板4と波板5を交互に巻き回してなり、楕円柱状に構成されている。その最外層は平板4となっている。外筒3は、例えばSUS430のようなフェライト系ステンレス鋼合金からなる合金を材料としており、その板厚は約1.5～2mmとされている。

【0015】平板4、波板5は、Cr20%、Al（アルミニウム）5%を含有するフェライト系ステンレス鋼合金を材料としており、その板厚は約50μmとされている。

【0016】ハニカム体2の前端面における平板4、波板5はレーザ溶接で固着して一体化されている。これにより、ハニカム体2のフィルムアウト現象を防止できる。そして、ハニカム体2上に被せられた外筒3の一端側3A（ハニカム体2の後端面2Bから略中央部分まで）を絞ることにより縮径した状態で、（ハニカム体2の外周面2Cと外筒3の一端側3Aを密着させた状態で、）Niろう箔材からなる高温用ろう材Rによりハニカム体2の外周面2Cと外筒3の一端側3Aはろう付け接合されている。

【0017】次に、上記の如き構成の金属ハニカム担体2の製造工法について図3により説明する。先ず、最初に、ステップ（1）において、金属製の平板4と波板5を交互に巻き回してなるハニカム体2を準備する。この時、ハニカム体2の前端面2Aにおける平板4、波板5は、レーザ溶接で固着して一体化されている。

【0018】ステップ（2）において、ハニカム体2の一端側にNiろう箔材からなる高温用ろう材Rが巻き込まれて第1中間体6が得られる。ステップ（3）におい

て、この第1中間体6を外筒3内に挿入し、外筒3の一端側3Aをダイス等の機械的手段によって絞って縮径した後、加熱炉に入れて高温熱処理を施すと、ステップ（4）に示すように、外筒3の一端側3Aとハニカム体2の外周面2Cがろう付け接合される。

【0019】以上の如き構成によれば、外筒3の一端側3Aを絞ることにより、ハニカム体2の外周面2Cと外筒3の一端側3Aを密着させた状態でろう付け接合がなされるので、絞り加工による外筒3の一端側3Aの縮径の度合いは、ハニカム体2の外周面2Cと外筒3の一端側3Aを密着させる程度で充分であり、ハニカム体2を構成する平板4、波板5を拡散接合させる程、外筒3の一端側3Aを絞り込む必要はなく、径方向の圧縮力を小さくすることができる。

【0020】従って、従来例のようにハニカム体2を構成する平板4、波板5に座屈が発生することを防止することができる。また、ハニカム体2の外周面2Cと外筒3の一端側3Aがろう付け接合され、且つ、ハニカム体2の前端面2Aがレーザ溶接が固着されているので、ハニカム体2の最外層から数層の部分のろう付け接合を不要にでき、それだけ、ろう材のコストダウンを図ることができる。また、ハニカム体2の内部を固着するために拡散接合を不要にすることができる。

【0021】さらに、一般のろう付け接合では、ハニカム体の平板、波板に含まれるアルミニウムが高温用ろう材Rの中に拡散して希釈され、特に、ハニカム体の最外層から数層は、高温条件下での耐酸化性は悪化する。

【0022】本実施例では、ハニカム体2の外周面2Cと外筒3のみがろう付け接合されており、外筒3は外の空気により常時冷却されており、排気ガスで上昇したハニカム体2内部の温度より大幅に温度が低くなっているため、外筒3とハニカム体2のろう付け部の耐酸化性を防止できる。

【0023】そして、ハニカム体2の外周面2Cと外筒3がろう付け接合されているので、ハニカム体2の外周面2Cと外筒3の間に隙間が生じる余地がなく、排気ガスのバイパス防止を図ることができる。

【0024】なお、本実施例においては、ハニカム体2の前端面2Aにおける平板4、波板5はレーザ溶接で固着して一体化されているが、後端面2Bにおける平板4、波板5はレーザ溶接で固着して一体化することもでき、また、前後端面2A、2Bにおける平板4、波板5をレーザ溶接でそれぞれ固着して一体化することもできる。

【0025】また、本実施例においては、ハニカム体2と外筒3の前記ろう付け工程の前工程で、ハニカム体2の内部はレーザ溶接されているが、ろう付け工程の後工程でレーザ溶接をすることもできる。

【0026】さらに、本実施例においては、ハニカム体2の最外層は平板4となっているが、凹凸の小さい小波



板5をハニカム体2の最外層にすることもできる。そして、本実施例においては、平板4、波板5は、Cr20%、Al（アルミニウム）5%を含有するフェライト系ステンレス鋼合金を材料としており、その板厚は約50 $\mu$ mとされているが、かかる数値に限定されことなく、例えば、平板4、波板5を、Cr18%、Al（アルミニウム）3%を含有して板厚約30 $\mu$ mのフェライト系ステンレス鋼合金等のアルミニウム含有フェライト系ステンレス鋼合金とすることができる。

【0027】そして、また、本実施例においては、外筒3はフェライト系ステンレス鋼合金であればどのような種類のものでも使用可能であるが、上述したSUS430のように加熱により拡散し易い金属を含まない合金が好ましい。耐熱性が良好であってもAl（アルミニウム）を含むステンレス合金は、加熱によりAl（アルミニウム）がろう材中に拡散してろう付け強度を低下させることがあるので、使用時には注意が必要とされる。

【0028】

【発明の効果】以上説明したように、本発明によれば、外筒の一端側を絞ることにより、ハニカム体の外周面と外筒の一端側を密着させた状態でろう付け接合がなされるので、絞り加工による外筒の一端側の縮径の度合いは、ハニカム体の外周面と外筒の一端側を密着させる程度で充分であり、ハニカム体を構成する平板、波板を拡散接合させる程、外筒の一端側を絞り込む必要はなく、径方向の圧縮力を小さくすることができる。

【0029】従って、従来例のようにハニカム体を構成する平板、波板に座屈が発生することを防止することができる。また、ハニカム体の外周面と外筒の一端側がろう\*

\*う付け接合し、且つ、ハニカム体の少なくとも一方の端面がレーザ溶接が固着されているので、ハニカム体の最外層から数層の部分のろう付け接合を不要にでき、それだけ、ろう材のコストダウンを図ることができる。また、ハニカム体の内部を固着するために拡散接合を不要にすることができる。

【0030】さらに、ハニカム体の外周面と外筒のみがろう付け接合されており、外筒は外の空気により常時冷却されており、排気ガスで上昇したハニカム体内部の温度より大幅に温度が低くなっているため、外筒とハニカム体のろう付け部の耐酸化性を防止できる。

【図面の簡単な説明】

【図1】本発明の実施例に係わる金属ハニカム担体の斜視図である。

【図2】同金属ハニカム担体の縦断面図である。

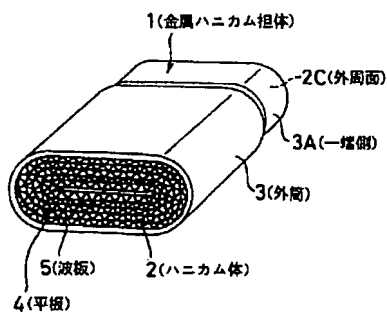
【図3】本発明の実施例に係わる金属ハニカム担体の製造工法を示す工程図である。

【図4】従来における金属ハニカム担体の斜視図である。

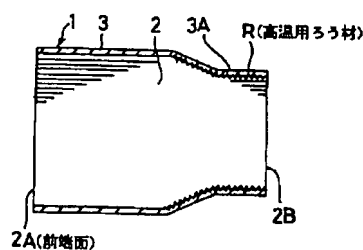
【符号の説明】

- 1 金属ハニカム担体
- 2 ハニカム体
- 2A 前端面（一方の端面）
- 2C 外周面
- 3A 一端側
- 4 平板
- 5 波板
- R 高温用ろう材

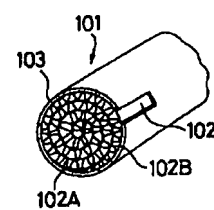
【図1】



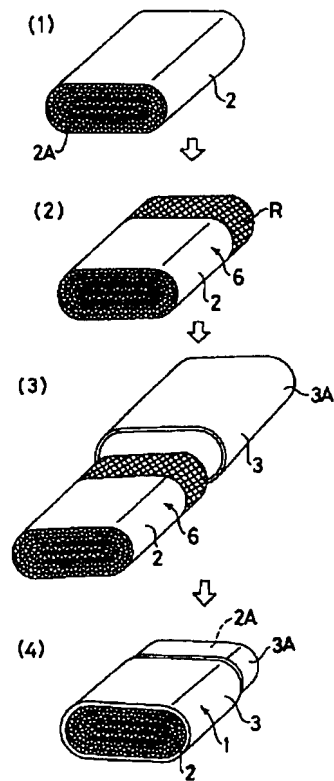
【図2】



【図4】



【図3】




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